



Early Journal Content on JSTOR, Free to Anyone in the World

This article is one of nearly 500,000 scholarly works digitized and made freely available to everyone in the world by JSTOR.

Known as the Early Journal Content, this set of works include research articles, news, letters, and other writings published in more than 200 of the oldest leading academic journals. The works date from the mid-seventeenth to the early twentieth centuries.

We encourage people to read and share the Early Journal Content openly and to tell others that this resource exists. People may post this content online or redistribute in any way for non-commercial purposes.

Read more about Early Journal Content at <http://about.jstor.org/participate-jstor/individuals/early-journal-content>.

JSTOR is a digital library of academic journals, books, and primary source objects. JSTOR helps people discover, use, and build upon a wide range of content through a powerful research and teaching platform, and preserves this content for future generations. JSTOR is part of ITHAKA, a not-for-profit organization that also includes Ithaka S+R and Portico. For more information about JSTOR, please contact support@jstor.org.

palatines, the head small, the first dorsal over the ventrals. *Atherina* is defined by Bonaparte as having very minute teeth, a sharper head and the dorsal over the middle of the length of the pectorals.

As a matter of fact, there is no important difference in the position of the dorsal, which, in both species, is over the middle of the ventrals when depressed, and well behind the tip of the pectorals. *Atherina boyeri* has a shorter head, more oblique mouth and rather larger teeth. But in this no generic difference appears. *Hepsetia* like *Membras*, must be considered as a synonym of *Atherina*.

DAVID STARR JORDAN,
Stanford University, Calif.

AMBLYSTOMA TIGRINUM ON LONG ISLAND

Ova and Early Larval Development

Snow and frost prevailing throughout March, field work during the present year was not resumed until April 7th, observations again being made on the Hudson Estate near Syosset, L. I. The day was sunny, but not warm, with a strong north wind. Mr. R. Deckert, of the New York Zoological Park, accompanied the writer. In the woods there were still patches of snow and ice, and the pools, which had served as breeding places last year and had become dry in summer or fall, were now filled to overflowing, indeed, in some places formed ponds of considerable size and depth. Examination of the flooded regions in the woods soon showed that they contained very little aquatic life, aside from numerous fairy shrimps (*Branchippus vernalis*), a few insects, and occasionally a woodfrog (*Rana sylvatica*), or a green frog (*Rana clamata*). The spring chorus of wood frogs

and peepers (*Hyla pickeringi*) came entirely from ponds in adjoining meadows. One of these ponds, from which last season a number of *Amblystoma* larvae were obtained, again showed a profusion of life. One corner teemed with woodfrogs, many of them paired, while others had finished breeding to judge from the egg masses attached to twigs and branches just below the surface of the water. The more secretive peepers were oftener heard than seen. Cricket frogs (*Acris gryllus crepitans*) were also out, but not yet in song.

Though our hopes of finding adults of *A. tigrinum*, either breeding in the water or hiding on the land, were not realized, we did notice, at some distance from shore and barely visible at the depth of a foot or more below the wind-ruffled surface, several masses of jelly attached to the stalks of dead plants. Securing one by means of a long-handled landing net, and feeling sure that it represented an egg-mass of *A. tigrinum*, Mr. Deckert waded in and obtained ten more. He also observed many others in inaccessible parts of the pond.

The egg-masses are rounded oblong or kidney-shaped. The largest measures 3 x 2 inches, the average being about two-thirds of that size. The number of eggs is 30 in the smallest and 110 in the largest mass. Unlike the egg-masses of woodfrogs, which are composed of an aggregation of small, jelly spheres each enveloping an egg, the egg-masses of *A. tigrinum* represent one homogeneous mass of jelly, within which the eggs are distributed irregularly. The eggs measure 3 mm. in diameter, the animal pole being dark brown and the vegetative pole light buff. They are closely surrounded by a clear cell 4 mm. in diameter. I can see no obvious difference between the eggs of this salamander and those of *A. punctatum*, except that the egg-masses of the latter species average larger in size and usually contain considerably over 100 eggs.

Unfertilized ova, indicated by white, opaque eggs, amount to about 20%. While actual observations concerning the date of ovulation were not obtained, it seems safe to assume that this could not have taken place until the ponds were at least partially free from ice, which would fix the date not earlier than April 1st. Some of the egg-masses, judging from the advanced state of disintegration of the unfertilized ova, probably were deposited about that date, others, estimated on the same basis, were not over 2 or 3 days old. Workmen on the Hudson Estate had not come across any of the adult salamanders so far during the present season.

April 10th.—The ova of two out of four egg-masses kept in an aquarium at the laboratory have changed in form from spherical to arcuate, causing a proportionate enlargement of the clear cell surrounding them. The ova in the other two egg-masses are still spherical though somewhat enlarged.

April 18th.—Two larvae have hatched and are actively swimming about. Total length, 13 mm. Head very large, flattened. Eyes prominent, pupil black, iris speckled golden yellow. Gills and caudal membrane well developed. Yolk sack almost absorbed. Limbs not visible. Color, dorsally olive grey, speckled and irregularly blotched; ventrally pale buff. Magnification shows asteroid arrangement of pigment cells embedded in skin. Caudal membrane, extending dorsally to gill slits and ventrally to vent, is translucent, showing very faint pigmentation.

Developing embryos frequently turn or wriggle within the clear cells which attain a maximum diameter of 10 mm. and are filled with "watery fluid."

April 22d.—Twelve larvae have hatched. They are feeding on the very young nymphs of mayflies and dragonflies, introduced with aquatic plants.

The remaining egg-masses are showing signs of decomposition and have been thrown out. A lot of ova of *Rana sylvatica*, collected for the purpose of feeding the *Amblystoma* larvae with young tadpoles, also had to be discarded for the same reason.

Accepting April 1st as the earliest date of ovulation, the average hatching period would be 20 days—7 under natural conditions out of doors and 13 in the laboratory at an average air temperature of 65° F.

May 9th.—Field observations. Another breeding place has been located in the woods north of the Syosset Railroad Station. Shallow pools, formed by melting snow earlier in the season, contain many egg-masses. An adjacent pond, stocked with fish, has none.

On the Hudson Estate a lower water level of the pools revealed many more egg-masses than were seen in April. The meadow pool alone (surface area about half an acre) has close to 100. Quite a number of the egg-masses are still in the arcuate embryo state; others have hatched recently. Evidently ovulation has been continued since the visit, April 7. The young larvae are rarely seen swimming about, but remain on the bottom, well concealed in their perfect color harmony with the vegetation. The hatching period, under natural conditions out of doors, appears to vary between 30 and 40 days, subject to weather conditions.

The young larvae, hatched in aquarium April 18 to 22, now measure 18 mm. in length. *Daphnia* and other small aquatic life so far have served as food.

GEORGE P. ENGELHARDT,

Brooklyn, N. Y.